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## TORQUE TOOL SOCKET RELEASE METHOD AND APPARATUS

### BACKGROUND OF THE INVENTION

0001 A nut runner or nut setter typically includes an air motor or electric motor that drives a typically square section sized to accept a plurality of sockets or implements that perform their function when turned or rotated by the motor. Retention of the sockets or implements in many applications is critical to prevent inadvertent disengagement of that part of the tool into the assembly being worked on. The socket or implement may come off or fall down into a complex assembly becoming "foreign objects or debris" otherwise known as FOD that must be found and removed before work can resume because of the damage or injury that may result. It is sometimes also a time consuming nuisance to reattach the socket or implement before assembly can continue.

0002 Generally, prior mechanisms that are supplied on power driven tools have a spring-loaded retention post or pin. These prior mechanisms are normally in the extended position so as to positively retain the socket or implement in place. They require a separate punch like tool to push them out of the way when installation or removal of the socket or implement is desired. This then poses the problem of finding the proper diameter tool and/or having it with the operator at all times in the event it is desired to remove and/or install another socket or implement from the power driven nut runner or nut setter. This process has proven in the past to be very time consuming, annoying and disruptive to manufacturing processes.

0003 Non power tool mechanisms that perform positive retention with built in actuator mechanisms for removal of sockets or implements are more complex than desired for performing the required function e.g. as seen in U.S Patent No. 4,794,828 issued January 3, 1989 to Olson which requires more than two pieces and a specially configured pin 50 with slot.

## SUMMARY OF THE INVENTION

0004 Accordingly, it is an object of the present invention to provide a built-in actuator on a power driven nut runner or nut setter.

0005 Another object of the present invention is to provide a positive retention and releasing mechanism for a socket or fitting on a power driven nut runner or nut setter.

0006 An important feature of the present invention is that the main work of providing positive retention and releasing of the socket or fitting is done utilizing two pieces: a sliding push rod, and a retention post or pin that move perpendicular to each other when the mating surfaces are engaged.

0007 A further important feature of the present invention is the provision of a shielding member that partially encapsulates the hand actuated end of the sliding push rod so that the positive retention mechanism is not inadvertently activated consequently releasing the socket or fitting.

0008 The present invention provides a method for quickly and easily retracting the post via a mechanism within the torque tool head. An embodiment of the invention utilizes a spring-loaded push rod through the head of the tool which mates with a modified socket retention post. When depressed, the push rod draws the post inward via an angle pin thereby allowing the socket to be removed or installed. After socket removal or installation, a spring returns the push rod to its original position, locking the post in the outward position without the requirement of separate tools. The socket release becomes part of the tool, permitting a function that can be performed quickly.

## BRIEF DESCRIPTION OF THE DRAWINGS

0009 FIG.1 is a simplified cutaway view of the socket retention post engaged;

0010 FIG.2 is a simplified cutaway view of the present socket retention post retracted;

0011 FIG.3 is a side view of a prototype nutrunner tool head showing the socket retention post engaged;

0012 FIG.4 is a side view of a prototype nutrunner tool head showing the socket retention post retracted;

0013 FIG.5 is illustrative of a close-up view of the prototype tool head with socket retention post engaged;

0014 FIG.6 is a close-up view of the prototype tool head with socket retention post retracted; and,

0015 FIG.7 is a cross sectional view of the present nut runner or nut setter with a 90 degree angle head, air motor or electric motor section not shown for simplicity.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

0016 The present invention hereinafter described provides a method for easily and quickly retracting the post by means of a mechanism within the torque tool head.

0017 Turning now briefly to FIG 1, there is seen a torque tool release apparatus which utilizes a spring-loaded push rod through the head of the tool, which mates with a modified socket retention post. When depressed, the push rod draws the post inward via an angle pin allowing the socket to be removed or installed as shown in FIG.2. After socket removal or installation, a spring returns the push rod to its original position, locking the post in the outward position. No separate tools are required. The hereinafter described socket release becomes part of the tool, and the function can be performed instantaneously.

0018 An overview of the present torque tool socket release method and apparatus is shown in FIGs 3 through 6. FIG.3 shows the present nutrunner tool head with socket

retention post engaged. FIG.4 shows the nutrunner tool head with socket retention post retracted. FIG.5 is a close-up of the present tool head with socket retention post engaged, and FIG.6 is a close-up of the tool head with socket retention post retracted.

0019 Turning now to a detailed description of the present torque tool socket release apparatus as shown in cut away view, it can be seen that the mechanism comprises a nutrunner or nut setter housing 1 which is sectioned near the 90-degree angle head 2 of the power tool. Bevel gears 5 (motor side) and 15 (output side) transfer the motor driven power to the nut runner or nut setter square drive 14 that is engaged into a socket or implement. The socket or implement is retained onto the square drive by the socket retention post 6 that moves perpendicular to push rod 13.

0020 When the mating surfaces of socket retention post 6 and angle pin 12 slide past each other, the socket or implement is either positively retained or released. When socket retention post 6 is extended outward in an engaged position, the socket or implement is retained.. If socket retention post 6 is retracted into nut runner square drive 14, the socket or implement can be slid on or off of the square drive. Return spring 10 is arranged to press against washer 9 that rides and presses against E-clip 8 that snaps into a groove cut into push rod 13.

0021 In normal operation, spring 10 is slightly compressed, keeping push rod 13 retracted thereby keeping socket retention post 6 in the engaged position. The socket or implement is thereby held in place until it is manually released by pressing push rod 13. At this point, return spring 10 would be further compressed and would return to the retracted position when pressure on push rod 13 is released. Washer 7 is provided in the present torque tool socket release apparatus to minimize wear that may occur on the end cap if E-clip 8 rotates with push rod 13. Press fit spring guide 4 and washer 11 that rides against the spring are herein shown as separate elements but alternatively could be formed as a single structure. Push-rod guard 3 is shown as part of end cap which is attached to press fit spring guide 4.